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ABSTRACT

Results of a recent study of attrition, retention, and transfer within the system of public higher education in Kentucky are summarized. Attrition, retention, and transfer rates are presented by class level and institution for 1979-80. For first-time full-time freshmen, the university system had an attrition rate of 27.9 percent, ranging from 20.6 percent to 43.9 percent. First-time part-time freshmen had an attrition rate of 64 percent in the university system, ranging from 58 percent to 74 percent. There was a high correlation between the attrition rate of first-time full-time freshmen at a university and its average composite score on the American College Testing (ACT) Program test. A single variate linear regression model relating attrition rate to ACT composite score accounts for 85.2 percent of the variation in attrition among the universities. Adding a qualitative variable to the model to indicate whether a university is primarily residential or commuter produces a new model that accounts for 96.1 percent of the variation in attrition among the universities. Attrition and transfer rates as a function of sex, race, and major are presented, along with plans to extend this project into a longitudinal study that will determine the stability of the rates, the reentry rate of students withdrawing from the system, the persistence rate of each year's cohort, and the average time for program completion. The system consists of eight universities and 13 community colleges. (Author/SW)

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ATTRITION, RETENTION, AND TRANSFER WITHIN THE KENTUCKY SYSTEM OF PUBLIC HIGHER EDUCATION

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This paper summarizes the results of a recent study of attrition, retention, and transfer within the system of public higher education in Kentucky. Student specific enrollment and degrees conferred information supplied by the eight universities and thirteen community colleges comprising the system and ACT reports comprise the data base. The retention set consists of all students registered at a particular institution in Fall 1979 and at that same institution in Fall 1980. The transfer set consists of all students registered at a particular institution in Fall 1979 and at another institution within the system in Fall 1980. The attrition set consists of all students who did not receive a degree from Fall 1979 through June 1980 and who were registered at a particular institution in Fall 1979 and at no institution within the system in Fall 1980. Tables providing the attrition, retention, and transfer rates by class level and institution are presented. For first-time full-time freshmen the university system has an attrition rate of 27.9 percent ranging from 20.6 percent to 43.9 percent among the universities. The corresponding rate for the community college system is 36.5 percent ranging from 28.0 percent to 47.3 percent. First-time part-time freshmen have an attrition rate of 64 percent in the university system ranging from 58 percent to 74 percent. Statistical analysis reveals a very high correlation between the attrition rate of first-time full-time freshmen at a university and its average composite ACT score. A simple single variate linear regression model relating attrition rate to ACT composite score accounts for 85.2 percent of the variation in attrition among the universities. Adding a qualitative variable to the model which indicates whether a university is primarily residential or commuter produces a new model which accounts for 96.1 percent of the variation in attrition among the universities. Attrition and transfer rates as a function of sex, race, and major are presented as are plans to extend this project into a longitudinal study which will determine the stability of the rates, the re-entry rate of students withdrawing from the system, the persistence rate of each year's cohort, and the average time for program completion.

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I. Introduction

Attrition, retention, and transfer rates are valuable parameters at both the institutional and state levels of analysis. Enrollment projection, an essential element in budget preparation and long range planning, depends directly on retention rates. Because of the high cost of providing education, attrition of students before they realize their degree objectives represents a serious economic loss as well as a personal disappointment. Much research has been directed toward the factors influencing attrition, and it is generally possible to develop a profile of "high risk" students. Retention programs are designed to neutralize those factors contributing to "high risk", and admission policies may be adjusted to increase retention rate.

Comparable attrition rates are not easily acquired. A recent survey of the subject (4) refers to a national study conducted in 1958 by Iffert (2) which concluded that 27.3 percent of first-year students will drop during their first year. NCES (3) conducted a longitudinal study of a sample of seniors from the high school class of 1972 and found that the withdrawal rate over a period of two years was 28.5 percent for public four year colleges and 39.8 percent for public two year colleges. Asten (1) concluded that, although high school grade point average and standardized test scores were about equal in their ability to predict withdrawal from college, both produced low accuracy in predictions of dropout.

Although the primary purpose of this project is to determine the current condition of student attrition, retention, and transfer within the Kentucky system of public higher education, it has been designed so that certain longitudinal characteristics such as the stability of the rates, re-entry rates of students withdrawing from the system, the persistence rate of each year's cohort, and the average time for program completions will emerge from annual continuation of the project. A secondary purpose is the identification of factors available at the state level such as ACT scores and race which correlate well with observed attrition rates.

In the next section we discuss the method employed in the study. Section 3 presents the results obtained for first-time freshmen, and Section 4 discusses these results and plans for additional analysis.

2. Method

The Council on Higher Education, in its capacity as the state center for higher education statistics, collects from each public university and college in Kentucky

student specific enrollment data and student specific degrees conferred data.

The Council has recently begun to supplement this data by acquiring from ACT those standardized test scores required for admission to public universities in Kentucky. A policy of open admissions prevails at all public institutions of higher education within the state. These data provided the information base for this phase of the Attrition, Retention, Transfer (ART) study which examines the retention of first-time freshman from Fall 1979 to Fall 1980.

For each institution students enrolled as first-time full-time freshmen in Fall 1979 are divided into three sets. The retention set consists of students registered at a particular institution in Fall 1979 and at that same institution in Fall 1980. The transfer set consists of students registered at a particular institution in Fall 1979 and at another institution within the system in Fall 1980. The attrition set consists of students registered at a particular institution in Fall 1979 and at no institution within the system in Fall 1980.

The retention ratio is defined as the number of students in the retention set divided by the total number of students in the three sets. Attrition and transfer ratios are similarly defined. These ratios are called rates when they are multiplied by 100 and expressed as a percentage.

The computer files corresponding to each of these sets contain student specific enrollment data such as sex, race, and major. When these files are merged with the ACT files, persistence can be analyzed in terms of student characteristics.

Part-time freshmen are treated in a similar manner.

3. Results

A. Rates

Table 1 presents the attrition, retention, and transfer rates of first-time full-time freshmen at the eight public institutions comprising the university system and the system averages. The number of first-time full-time freshmen at each institution is also recorded.

Table 2 presents the attrition, retention, and transfer rates of first-time full-time freshmen at the fourteen colleges comprising the community college system and the system averages.

TABLE 1. Attrition, Retention, Transfer Rates of First-Time Full-Time Freshmen from Fall 1979 to Fall 1980 within the Kentucky University System

Rate	EKU	KSU	MoSU	MuSU	NKU	UK	UL	WKU	SYSTEM
Retention	65.9	51.1	62.8	68.7	63.2	72.1	63.0	65.6	66.6
Attrition	27.9	43.9	32.3	26.3	34.9	20.6	30.8	29.2	27.9
Transfer	6.2	5.0	4.8	5.0	1.9	7.3	6.1	5.3	5.7
No. of Students	2352	278	1033	1035	1048	3270	2124	2239	13649

TABLE 2. Attrition, Retention, Transfer Rates of First-Time Full-Time Freshmen from Fall 1979 to Fall 1980 within the Kentucky Community College System.

Rate	Ashland	E-town	Hazard	Henderson	Hopkinsville	Jefferson	Jeff.SW	L.T.I
Retention	56.8	61.2	53.4	49.3	52.5	46.1	42.3	45.6
Attrition	34.1	29.0	29.8	47.1	37.6	47.3	38.0	41.7
Transfer	9.1	9.8	6.8	3.6	9.9	6.6	19.7	12.7
No. of Students	287	379	88	138	202	516	71	259

Rate	Madisonville	Maysville	Paducah	Prestonsburg	Somerset	S.E.	SYSTEM
Retention	38.9	57.1	65.1	55.8	63.1	51.0	54.1
Attrition	42.8	31.9	28.0	29.0	30.6	43.0	36.5
Transfer	18.3	11.0	6.9	15.2	6.3	6.0	9.2
No of Students	131	91	375	138	252	100	3027

TABLE 3. Attrition, Retention, Transfer Rates of First-Time Part-Time Freshmen from Fall 1979 to Fall 1980 within the Kentucky University System.

Rate	EKU	KKU	MoSU	MuSU	NKU	UK	UL	WKU	SYSTEM
Retention	22.8	27.6	23.3	24.3	36.0	31.6	36.8	24.7	30.7
Attrition	74.0	70.1	59.2	72.8	62.8	58.1	58.2	70.9	64.0
Transfer	3.2	2.3	17.6	2.9	1.2	10.3	5.1	4.3	5.2
No. of Students	285	87	245	103	564	136	710	392	2522

TABLE 4. Attrition, Retention, Transfer Rates of First-Time Part-Time Freshmen from Fall 1979 to Fall 1980 within the Kentucky Community College System.

Rate	Ashland	E-town	Hazard	Henderson	Hopkins-ville	Jef-ferson	Jeff-S.W.	L.T.I.
Retention	33.3	35.1	10.7	19.5	17.1	33.1	40.0	25.9
Attrition	65.3	60.6	82.1	80.5	70.4	61.4	54.4	68.0
Transfer	1.3	4.3	7.1	0.0	12.5	5.5	5.6	6.1
No. of Students	75	94	28	77	152	420	90	147

Rate	Madisonville	Maysville	Paducah	Prestons-burg	Somerset	S.E.	SYSTEM
Retention	19.8	38.6	31.9	27.4	42.1	15.8	28.3
Attrition	76.7	34.1	63.7	65.8	47.4	57.0	63.8
Transfer	3.5	27.3	4.4	6.9	10.5	27.2	7.9
No. of Students	116	44	113	73	57	114	1600

Tables 3 and 4 provide similar information for first-time part-time freshmen.

First-time full-time freshmen in the university system have an overall attrition rate of 27.9 percent ranging from 20.6 percent to 43.9 percent among the eight universities. The system rate is considerably above that reported by NCES (3), indeed it is almost equal to the two year withdrawal rate of 28.5 percent reported by NCES.

First-time full-time freshmen in the community college system have an overall attrition rate of 36.5 percent ranging from 28.0 percent to 47.3 percent. This also is only slightly less than the two year withdrawal rate from public two-year colleges of 39.8 percent reported by NCES.

First-time part-time freshmen in the university system have a very high overall attrition rate of 64.0 percent ranging from 58.1 percent to 74.0 percent among the universities. The corresponding rate for the community college system is 63.8 percent ranging from 34.1 percent to 82.1 percent.

From Table 5 it is apparent that there is a significant difference between attrition rates calculated from student specific data and those obtained by the net class size method. Table 5 compiles attrition rates obtained in this student specific study (ART) and those obtained using the net class size method which simply compares the sophomore enrollment in 1980 with the freshman enrollment in 1979. Attrition rates from the sophomore to the junior level are also presented to emphasize the difference.

TABLE 5. Comparison of Attrition Rates by ART and the Net Class Size Methods

	EKU		KSU		MoSU		MuSU		NKU		UK		UL		WKU	
	F/S	S/J	F/S	S/J	F/S	S/J	F/S	S/J	F/S	S/J	F/S	S/J	F/S	S/J	F/S	S/J
NET CLASS SIZE	29.0	35.2	40.5	32.3	42.3	33.1	40.9	18.4	25.9	49.8	24.0	-4.5	47.5	15.7	37.2	27.6
ART	29.2	17.2	43.0	30.4	32.3	22.3	29.8	20.8	34.9	19.3	21.9	15.9	31.1	20.6	32.7	17.6

B. System Attrition Models

There is sufficiently reliable information to compute the average ACT composite score for first-time full-time freshmen at each university. A simple first order linear

TABLE 6. SAS Regression Analysis of a Simple Linear Model Relating Attrition Rate to Average University ACT Composite Score of First-Time Full-Time Freshmen in Fall 1979. ATR = A + B * (ACT)

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: ATR

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	1	277.57152386	277.57152386	34.46	0.0011	0.851711	9.2332
ERROR	6	48.31722614	8.05453769		STD DEV		ATR MEAN
CORRECTED TOTAL	7	325.88875000			2.83805174		30.73750000

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE IV SS	F VALUE	PR > F
ACT	1	277.57152386	34.46	0.0011	1	277.57152386	34.46	0.0011

PARAMETER	ESTIMATE	T FOR HO: PARAMETER=0	PR > |T|	STD ERROR OF ESTIMATE
INTERCEPT	75.71598569	9.80	0.0001	7.72734459
ACT	-2.66348484	-5.87	0.0011	0.45370370

TABLE 7. SAS Regression Analysis of a Liner Model Relating Attrition Rate to Average University ACT Composite Score First-Time Full-Time Freshmen in Fall 1979 and to Its Residential Character. ATR = A + B * (ACT) + C (CTG).

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: ATR

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	2	312.97245005	156.55146503	61.17	0.0003	0.960737	5.2045
ERROR	4	12.79581995	2.55916399		STD DEV		ATR MEAN
CORRECTED TOTAL	7	325.89875000			1.59973873		30.73750000

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE IV SS	F VALUE	PR > F
ACT	1	277.57152386	108.46	0.0001	1	301.20451339	117.70	0.0001
CTG	1	35.53143620	13.88	0.0136	1	35.53140620	13.88	0.0136

PARAMETER	ESTIMATE	T FOR HO: PARAMETER=0	PR > |T|	STD ERROR OF ESTIMATE
INTERCEPT	76.87490394	17.60	0.0001	4.36680117
ACT	-2.60488442	-10.85	0.0001	0.23854416
CTG	4.92052998	3.73	0.0136	1.32049600

single variate regression model relating the institutional attrition rate and ACT composite score accounts for 85.2 percent of the variation of the attrition rate among institutions. Table 6 presents the output of the SAS GLM regression analysis which yields the model

$$ATR = 75.7 - 2.66\ (ACT) \qquad (1)$$

Adding a qualitative variable which indicates whether an institution is primarily a commuter or primarily a residential university is appropriate in Kentucky where two universities, NKU and UL, have a very large percentage of commuters and the other six do not. Table 7 presents the output of the SAS GLM regression analysis which yields the model

$$ATR = 76.9 - 2.80\ (ACT) + 4.92\ (CTG) \qquad (2)$$

where the qualitative variable CTG has the value of one for a commuter university and zero for a residental university. This simple model accounts for 96.1 percent of the variation in attrition among the universities.

These successful models cannot be applied to the community college system because so many students do not take the ACT test.

C. Persistence and ACT within Institutions

The ability of the average institutional ACT composite score to predict the institutional attrition rate suggests that intra-institutional analysis may be of interest. Table 8 presents the attrition rate for students at each university as a function of their ACT score. Thus first-time full-time freshmen at UK with composite ACT score between 10 and 12 had attrition rate of 35.2. Also recorded is the percentage of first-time full-time freshmen for whom the ACT score was known, and this is the percentage of first-time full-time freshmen included in the study.

Comparison of the aggregate attrition of first-time full-time freshmen having ACT scores, R'_A, with the attrition rate of all first-time full-time freshmen, R_A, gives an indication of how representative the rates in Table 8 are and what ACT range the excluded students would have. Because 91.9 percent of UK freshmen were involved in the calculation of the rates in Table 8, it is not surprising that R'_A is almost equal to R_A. Similarly with only 66.2 percent of the freshmen involved in the study at NKU it is not suprising that R'_A is almost 5 percentage points below R_A, but this does suggest that the distribution of students not included in the study would be skewed in the direction of low ACT scores.

Because only 32.4 percent of the freshmen at KSU were included in the study and because the freshmen class is so small, the rates recorded in the column of Table 8 are not representative of the actual attrition rates at KSU.

Intrainstitutional attrition rates show the same rapid decline with increasing ACT as was manifested in the interinstitutional study reported above.

TABLE 8. Attrition Rate by ACT Cell and University (First-time full-time freshmen) Fall 1979 to Fall 1980.

ACT	EKU	KSU	MoSU	MuSU	NKU	UK	UL	WKU
10	34.3	26.9	33.3	43.6	53.3	44.1	43.8	56.6
10-11	30.2	22.2	42.5	42.4	50.0	35.2	30.4	44.2
12-13	33.0	37.5	36.2	36.5	39.4	32.6	37.8	35.9
14-15	28.1	12.5	30.4	27.8	43.2	29.0	37.7	27.7
16-17	24.7	28.6	21.9	27.9	27.0	23.8	23.0	25.9
18-19	20.3	22.2	14.5	22.5	20.0	17.9	23.9	22.9
20-21	22.2	- -	23.3	15.4	27.6	17.6	19.7	16.4
22-23	23.4	33.3	16.3	17.0	21.6	21.1	16.9	16.0
24-25	8.6	- -	15.6	21.1	9.3	12.7	12.5	19.6
26	14.1	- -	12.5	8.0	16.7	11.3	15.1	13.9
Percent of Fresh. (P)	66.1	32.4	62.6	78.1	66.2	91.9	65.2	79.9
ACT Attrition (R'_A)	25.1	24.4	27.2	24.0	30.0	20.2	25.0	27.4
Overall Attrition	27.9	43.9	32.3	26.3	34.9	20.6	30.8	29.2

Table 9 presents the transfer rate for each ACT cell and each university. With the possible exception of UK, the transfer rate is independent of ACT composite score.

TABLE 9 Transfer Rate by ACT Cell and University (First-time full-time freshmen) Fall 1979 to Fall 1980

ACT	EKU	KSU	MoSU	MuSU	NKU	UK	UL	WKU
10	3.8	7.7	9.3	2.6	- -	2.9	8.2	6.2
10-11	4.7	3.7	2.5	8.5	- -	11.4	8.8	5.5
12-13	6.6	- -	1.1	4.8	2.8	11.2	8.7	5.6
14-15	8.0	- -	4.5	6.1	2.1	10.4	6.8	5.2
16-17	6.7	14.3	5.5	8.1	3.4	8.2	9.3	4.2
18-19	8.2	11.1	5.8	5.6	1.1	7.4	8.0	5.5
20-21	5.1	- -	3.3	10.3	1.2	7.9	4.6	6.7
22-23	9.2	- -	8.2	2.7	1.2	6.7	4.9	3.6
24-25	3.7	50.0	6.3	3.3	1.9	5.1	3.3	6.8
26	2.8	- -	4.2	1.8	- -	3.6	5.4	5.2
Total Number of Transfers	100	6	30	56	11	214	94	96

Table 10 presents the student specific retention, attrition, and transfer rates for first-time full-time freshmen within the university system for each ACT cell.

TABLE 10 State University System Aggregate ACT/ART Data for First-Time Full-Time Freshmen. Fall 1979 to Fall 1980

ACT	Number of Students	Number of Students Retained	Retention Rate	Number of Attritions	Attrition Rate	Transfer Rate
10	524	267	51	229	44	5
10-11	739	417	56	227	37	7
12-13	986	574	58	348	35	7
14-15	1,206	753	62	371	31	7
16-17	1,162	795	68	288	25	7
18-19	1,376	1,004	73	281	20	7
20-21	1,185	883	75	226	19	6
22-23	1,140	855	75	222	19	6
24-25	883	717	81	124	14	5
26	1,001	841	84	123	12	4
TOTAL	10,202	7,106		2,489		

TABLE 11. Attrition Rate of Black and Non-Black First-Time Full-Time Freshmen within the University System from Fall 1979 to Fall 1980

University	Number of Blacks	Number of Non-Blacks	Attrition Rate Blacks	Attrition Rate Non-Black
EKU	190	2162	32	28
KSU	217	61	43	46
MoSU	51	983	33	32
MuSU	75	1230	32	26
NKU	12	1036	67	35
UK	135	3135	30	20
UL	220	1912	43	30
WKU	228	2014	39	28
University System	1,128	12,533	38	27
Community College System	209	1,803	50	34

Table 11 compares the attrition rates for black and non-black first-time full-time freshmen within the public system of higher education. Blacks represent 8.5 percent of the first-time full-time freshmen within public higher education and in 1976 they accounted for 8.8 percent of the population of Kentucky.

Finally in Table 12 the attrition rates from Fall 1979 to Fall 1980 associated with majors declared by first-time full-time freshmen at the University of Kentucky and the University of Louisville for whom ACT scores were available.

TABLE 12. Attrition Rate and Median ACT Cell by Major for First-Time Full-Time Freshmen at University of Kentucky and University of Louisville. Fall 1979 to Fall 1980

	University Kentucky			University Louisville		
STUDENT MAJOR (HEGIS CODE)	NUMBER OF STUDENTS	MEDIAN ACT CELL	ATTRITION RATE	NUMBER OF STUDENTS	MEDIAN ACT CELL	ATTRITION RATE
00	993	18/19	20.3	391	16/17	26.1
01	165	20/21	32.1	—	—	—
04	118	20/21	5.9	55	20/21	21.8
05	504	20/21	19.4	210	16/17	26.7
06	145	20/21	22.1	58	16/17	22.4
07	84	22/23	20.2	32	24/25	12.5
08	172	18/19	20.4	42	14/15	16.1
09	299	24/25	16.1	141	24/25	12.1
10	75	18/19	30.7	62	18/19	37.1
13	77	18/19	19.5	—	—	—
15	17	20/21	23.5	11	16/17	36.4
17	14	24/25	7.1	7	22/23	14.3
19	70	24/25	17.1	34	20/21	29.4
20	49	18/19	30.6	40	16/17	22.5
21	29	16/17	31.0	22	12/13	45.5
22	96	24/25	20.8	59	20/21	20.3

Discussion

Although the attrition, retention and transfer study was performed for all student levels, the report examines the results for freshmen only. Attrition in the Kentucky system of higher eudcation is high, perhaps a result of the "open admissions" policy mandated for all public institutions. As expected the attrition within the community college system is higher (ten percentage points) than that in the university system. Attrition for part-time freshmen is very high (64 percent) and the same for the university and community college system.

The most suprising result was the ability of the simple model in equation (2) containing two independent variables, ACT composite score and the commuter/residence character of the university, to account for 96 percent of the variation of attrition rate among the universities. Previous persistence studies have noted that high school grade average and standardized test scores are about of equal value in predicting dropout and that neither is a good predictor. More recent studies have tended to concentrate on social/cultural/environmental factors as determinants of the propensity for attrition. The universities comprising the Kentucky system are autonomous and very diverse in faculty, attitude, mission, location, and student body. Programs to assist disadvantaged freshmen vary greatly in scope and content. Why is there not greater variation in the institutional attrition rates that would reflect the differences in the developmental programs within the state?

At the institutional level the attrition rate decreases rapidly with ACT composite score and is remarkably similar among the universities when one takes into account the commuter/residential character of the university and the fraction of students having ACT scores.

Transfer rate does not appear to be related to ACT score.

The attrition rate for blacks is considerably higher than that for non-blacks in both the university and community college system.

The impending availability of Fall 1981 enrollment data will permit us to examine the stability of the rates and the return rate of dropouts.

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